are given topical steroids during the first month of life and other possible adverse effects probably warrant investigation.

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Peripheral blood lymphopenia in gangrenous appendicitis

Marjan Jahangiri, J H Wyllie

Academic Unit of Surgery, University College London, Whittington Hospital, London N19 5NF
Marjan Jahangiri, MB, *house surgeon*
J H Wyllie, MD, *professor*

Correspondence to: Dr Jahangiri.

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During acute infections the neutrophil count increases, but changes in the lymphocyte count have not been similarly reported. We studied patients with appendicitis retrospectively to see whether changes in the lymphocyte count had occurred.

Patients, methods, and results

We used a list of sequential admissions to one surgical unit to obtain 100 consecutive patients with a clinical diagnosis of appendicitis in whom blood counts had been measured preoperatively with a Technicon H1 analyser. In four cases we found that the blood counts had been measured with a different machine so these records were discarded, leaving 96 patients. We obtained a control group from the same list by taking the first patient who had had an uncomplicated elective operation for hernia or varicose veins after each appendicectomy. Of 100 such patients, only 22 had had their blood counts measured with a Technicon H1 analyser preoperatively, and they formed the control group. All 118 patients were aged 15 or over.

Not all the clinical diagnoses of appendicitis had been confirmed by histological examination so we used the histological report to classify the patients as having a histologically normal appendix (28), acute appendicitis (52), or gangrenous appendicitis (16).

The table gives the geometric means of the counts of neutrophils, lymphocytes, and eosinophils and their 95% confidence intervals. A striking increase in the neutrophil count occurred in patients with acute and gangrenous appendicitis; in the patients with gangrenous appendicitis this was accompanied by a fall in the lymphocyte count. The significance of these changes was assessed by analysis of variance of the logarithms of the actual values, which had a skewed distribution. Differences between consecutive groups of patients in the table—for example, patients with acute and gangrenous appendicitis—were assessed by the extended Tukey test. Thus the neutrophil count was higher in the patients with clinical appendicitis than in those with hernias and varicose veins; and even higher in those with acute appendicitis; there was no further increase in the patients with gangrenous appendicitis. In contrast, the lymphocyte count was lower in the patients with gangrenous than in those with acute appendicitis ($p<0.025$) or clinical appendicitis ($p<0.01$) but was not significantly different in the patients with clinical appendicitis and those with acute appendicitis confirmed by histological examination. Eosinophil counts fell with increasing severity of appendicitis. Counts of basophils, monocytes, platelets, and large cells unclassified by the analyser were also examined, but no significant changes were found.

Comment

In addition to the established rise in the neutrophil count we found a significant fall in the lymphocyte count in patients with gangrenous appendicitis ($p<0.01$) compared with control patients and patients with clinical appendicitis not confirmed by histological examination. Blood samples were taken before any treatment so the changes cannot be attributed to drugs, the operation, or the anaesthetic. An increase in the total white cell count and a high percentage of neutrophils in acute appendicitis have often been reported, but even recent reports have not commented on an absolute fall in lymphocyte count.[1,2]

Although similar falls in T cell counts have been reported in patients who have been burnt,[3] animal experiments suggest that changes in lymphocyte subpopulations may be the result of infection rather than trauma.[4]

The mechanism of lymphopenia in gangrenous appendicitis may be a direct toxic action on the lymphocytes or it may be indirect—for example, through the depleting effect of glucocorticoids. An indirect mechanism is suggested by the simultaneous fall in the eosinophil count. Alternatively, the lipopolysaccharide endotoxins of bacteria in the gut have been shown to provide a prolonged and powerful stimulus for recruiting lymphocytes from the circulation in rats.[5] Thus lymphopenia in gangrenous appendicitis may at least partly be due to sequestration of lymphocytes in the phlegmon.

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Geometric mean counts ($\times 10^9$/l) of peripheral blood neutrophils, lymphocytes, and eosinophils according to diagnosis (95% confidence intervals)

Diagnosis	No of patients (n=118)	Neutrophil count	Lymphocyte count	Eosinophil count
Varicose veins, hernia	22	3·59 (3·52 to 3·66)**	1·68 (1·63 to 1·72)	0·12 (0·10 to 0·14)
Clinical appendicitis with normal histology	28	6·64 (6·54 to 6·74)**	1·52 (1·49 to 1·55)	0·10 (0·09 to 0·11)*
Acute appendicitis	52	11·10 (11·02 to 11·19)	1·26 (1·25 to 1·28)***	0·04 (0·04 to 0·04)
Gangrenous appendicitis	16	11·33 (11·03 to 11·64)	0·79 (0·76 to 0·82)	0·02 (0·02 to 0·03)

Extended Tukey test of differences between consecutive groups of patients (for example, between those with varicose veins and hernias and those with clinical appendicitis): *$p<0.05$, **$p<0.01$, ***$p<0.025$.